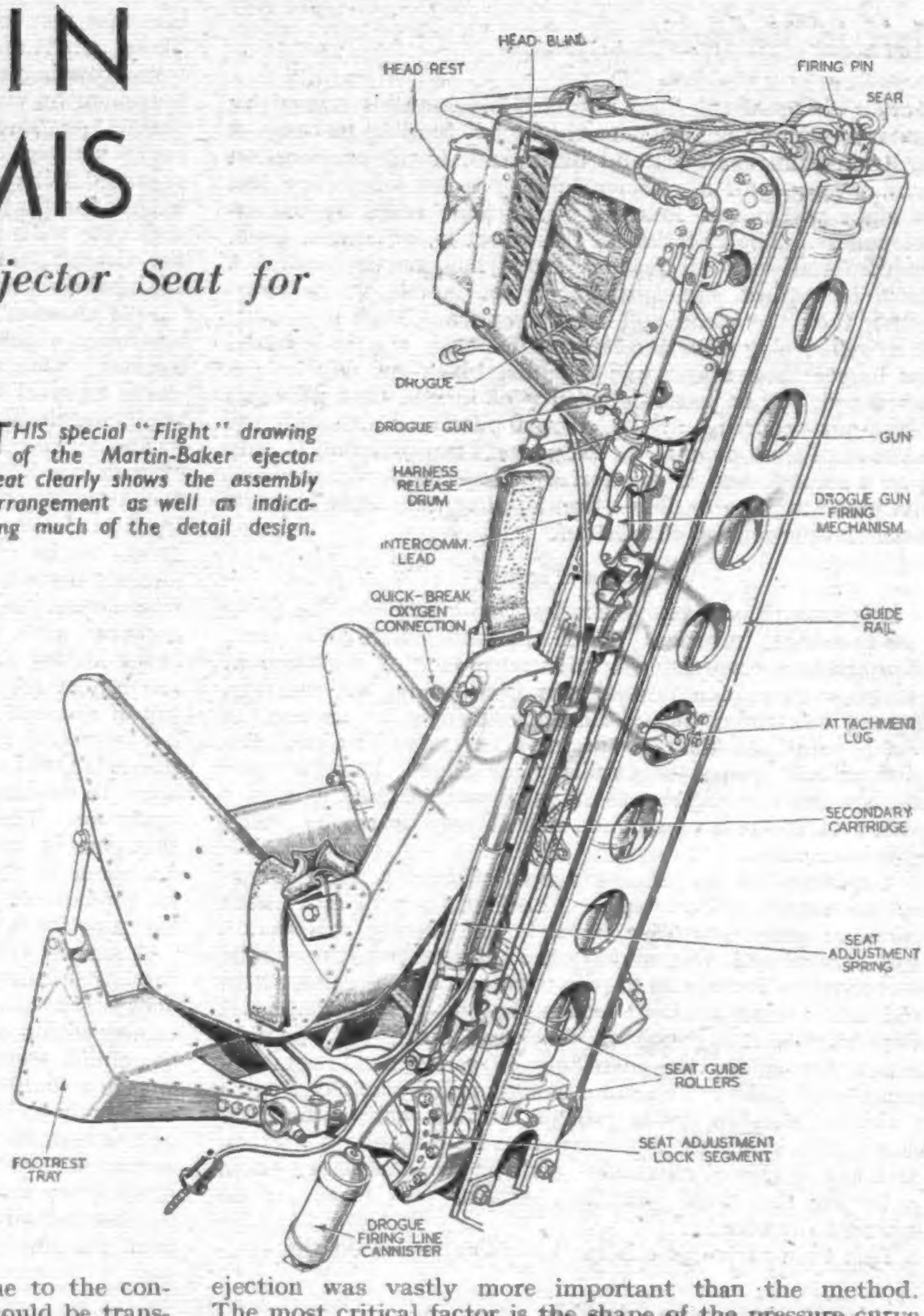
EXIT IN EXTREMIS

Latest Development of Ejector Seat for High-speed Escapes



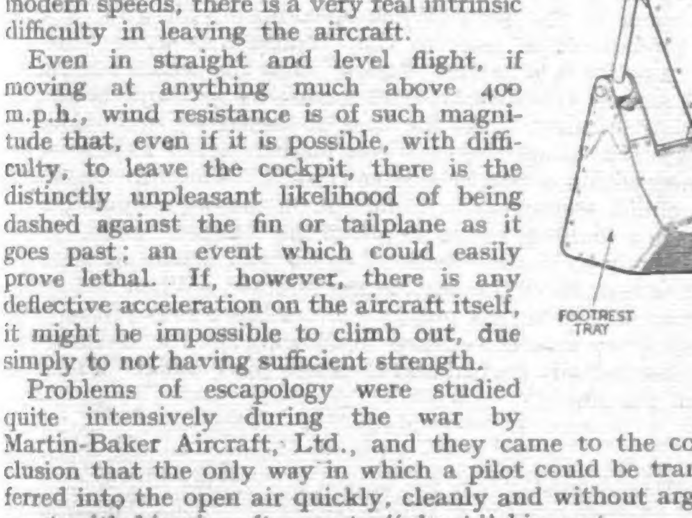
THIS special "Flight" drawing of the Martin-Baker ejector seat clearly shows the assembly arrangement as well as indicating much of the detail design.

WHAT the general attitude of mind toward taking to a parachute is among the pilots of high-speed aircraft we have no reliable means of assessing, but no doubt if faced with sufficiently stark an alternative, no one would, perhaps, hesitate unduly about getting out. As a physical operation this is reasonably easy, providing one is not travelling too quickly; however, when flying at the most modern speeds, there is a very real intrinsic difficulty in leaving the aircraft.

Even in straight and level flight, if moving at anything much above 400 m.p.h., wind resistance is of such magnitude that, even if it is possible, with difficulty, to leave the cockpit, there is the distinctly unpleasant likelihood of being dashed against the fin or tailplane as it goes past; an event which could easily prove lethal. If, however, there is any deflective acceleration on the aircraft itself, it might be impossible to climb out, due simply to not having sufficient strength.

Problems of escapology were studied quite intensively during the war by Martin-Baker Aircraft, Ltd., and they came to the conclusion that the only way in which a pilot could be transferred into the open air quickly, cleanly and without argument with his aircraft, was to "shoot" him out.

The mechanics of such an operation can be said to be relatively simple but the fact that the freight is human does introduce difficulties. The *corpus homo* is a wonderful shock absorber and is capable of taking an immense amount of punishment; however, there are limits, and Martin-Baker found quite early on that the manner of ejection was vastly more important than the method. The most critical factor is the shape of the pressure curve in terms of g developed against time, and it is far more important that the curve should be linearly progressive so that the increment of acceleration is substantially uniform, rather than that a very large initial impulse should be administered which then rapidly tails away.



Pressure curves for Martin-Baker seat, showing development of acceleration against time and against gun stroke.

The curves in the accompanying illustrations clearly show this point. The maximum g developed with the M-B seat is 18.75, this occurring approximately ⅛ of a second after firing. Although ⅛ of a second can be regarded as a very short interval of time, it is a matter of degree, for other ejector seat experiments have shown pressure-curve slopes so steep as to indicate initial acceleration being applied at the rate of 600 to 700 g per second. Such an acceleration as this imposes a quite unacceptable impact on the human body, which would certainly damage the vertebrae and, incredible though it may seem, is also insufficient to throw seat and pilot clear of the aircraft. On the M-B test tower, an ejection with a tremendous initial peak acceleration of this kind lifted the seat only 20ft, whereas the company's own seat, fired with a progressive acceleration to a peak of only 18.75 g, is lifted 80ft. The slope of the pressure curve for the M-B seat is such that the maximum rate of acceleration applied is under 200 g per second; in fact, the total time of the expulsion stroke is only approximately ⅕ of a second.

It might well be imagined that imposing an acceleration of even 18.75 g on the human body would result in something pretty terrifying in the way of black-out, but in actual